Enhancing Community Safety: Installation of CCTV Systems in Selected Barangays in the Province of Bulacan

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ABSTRACT

The research focused on creating an enhanced CCTV system intended to secure specific areas within the concerned Barangays. To achieve this objective, the following tasks were completed: (1) Develop a CCTV system tailored to the specific characteristics of the concerned Barangays; (2) Assemble and construct an enhanced CCTV system, followed by experimentation and adjustments as needed; (3) Carry out monitoring activities to assess the effectiveness of the system; and (4) Perform an impact assessment to evaluate the effects of the CCTV structure on stakeholders in the area. The research methodology employed in this study was the developmental method, which involves systematically examining products, tools, processes, and models to provide reliable and practical information to both practitioners and theorists.

The assessment of the extension project by the beneficiaries, regarding the service provided by the proponents, received a rating of very highly acceptable. Additionally, a qualitative assessment was conducted. Beneficiaries expressed satisfaction with the impact of the CCTV system installation, which played a crucial role in addressing various incidents within the vicinity. The system not only shed light on these occurrences but also facilitated their resolution, underscoring its effectiveness in enhancing safety and security in the area.

Keywords: Closed Circuit, Camera, Security

INTRODUCTION

Presently, society is burdened with numerous crime incidents; in the past, crime was more prevalent in urban areas. However, with the fast pace of progress, crime has lamentably trickled into once-peaceful rural areas. Such a problem is one of the major concerns of many barangays or villages. Petty crimes such as vandalism and more serious crimes have escalated in recent years with their limited police force, they could only do so much to ensure peace and order.

Closed-circuit television (CCTV) systems increase the risk of apprehension for those who partake in crime. CCTV systems may have active monitoring, such that an individual watches the CCTV images and contacts security or the police if a violation is in progress; passive monitoring systems do not have individual call security or the police but store evidence (the image and video files) for subsequent apprehension and prosecution purposes (Reid & Andresen, 2012).

Crime decreased by 51 percent in experimental areas compared with control areas. The data is supported by five studies revealing a significant crime reduction Welsh and Farington (2009).

Ariel et al. (2015) find evidence suggesting that CCTV surveillance can reduce crime rates in public places. Studies included in the review report show a decrease in various crime types, including theft, vandalism, and assault, following the installation of CCTV systems and that CCTV surveillance enhances situational awareness among law enforcement agencies and security personnel, enabling proactive responses to

emerging security threats and criminal activities. Real-time monitoring of CCTV footage allows for prompt intervention and the effective deployment of resources to address public safety concerns.

Gill and Spriggs (2005) observed a CCTV system with few operators relative to the number of cameras, making live monitoring difficult. As such, this system was considered more of a reactive CCTV system that gathered evidence the police could use in prosecutions (Reid & Andresen, 2012). Despite this limitation with live monitoring, a noticeable reduction in crime was experienced.

When analyzing the types of crimes that CCTV primarily affects, vehicle theft frequently emerges as the most common issue in these environments. This has been a consistent finding across various studies, where targeted evaluations reveal that theft from vehicles is notably the type of crime experiencing the most considerable decrease post-CCTV installation (Di Leo, 2024).

The effectiveness of CCTV in reducing crime varies depending on factors such as location, design, and implementation. While some studies report significant reductions in crime rates associated with CCTV installation, others find limited or no impact. The presence of CCTV may deter potential offenders and increase the likelihood of apprehension and conviction for criminal activities captured on camera (Wang & Taylor, 2018).

Successful implementation of CCTV involves more than just installation; it requires strategic planning regarding camera placement and monitoring. Placing cameras to oversee specific high-risk areas in parking lots can lead to optimal outcomes in crime deterrence. Studies recommend that parking lot managers consider monitoring entrances, exits, and other critical locations for maximum effect (Le Duc, 2024).

Kuhns and McGarrell (2012) underscore the importance of leveraging CCTV surveillance as a valuable tool for tracking emerging crime patterns and enhancing situational awareness in urban environments. By harnessing the insights from CCTV footage, law enforcement agencies can develop proactive strategies to address evolving security challenges and improve community safety (Wilson & Sutton, 2003).

Gill (2014) conducted a study that contributes to understanding the role of surveillance cameras in crime prevention efforts, highlighting the need for methodologically rigorous research to assess their impact on public safety accurately. By synthesizing findings from randomized and natural experiments, the review offers valuable insights and recommendations for policymakers, law enforcement agencies, and researchers involved in implementing and evaluating CCTV surveillance programs (Yar, 2007).

Tien (2017) stressed the potential of CCTV footage to identify and track emerging crime patterns in real-time. Law enforcement agencies can gain insights into spatial and temporal trends in criminal behavior by analyzing video data collected from CCTV cameras deployed in public spaces. CCTV surveillance enables the identification of crime hotspots and high-risk areas within urban landscapes. By mapping crime incidents captured on camera, researchers can pinpoint geographic locations experiencing elevated levels of criminal activity and allocate resources accordingly for targeted intervention (Gau & Pratt, 2010).

Ongoing analysis and evaluation of CCTV systems are vital to maintaining effectiveness and adapting to emerging crime patterns. Tracking the impact of camera installations on specific crime types ensures that the surveillance systems achieve their intended outcomes and address concerns about crime displacement. Regular assessment can contribute to refining security measures and maintaining public safety in areas (Di Leo, 2024).

To alleviate these challenges, many LGUs have opted to collaborate with universities and technical institutes, seeking their expertise in designing and implementing CCTV systems. By leveraging academic resources, local governments can not only gain technical assistance but also incorporate evidence-based practices that have been demonstrated to maximize the effectiveness of surveillance systems in various

contexts. Such partnerships can enhance the overall security infrastructure of communities through well-informed decisions regarding CCTV placement and technology (Krew, 2024).

While the installation of CCTV systems poses technical challenges for local government units, collaborative efforts with academic institutions can bridge these gaps, ensuring that communities are equipped with effective security measures.

Project Objectives

The study focused on developing an Improved CCTV system to enhance security measures in specific areas of Barangay San Miguel, Calumpit, Bulacan, and Barangay Tibig, Bulakan, Bulacan.

To effectively address the main problem, several specific questions needed to be addressed. The study aimed to determine the most efficient utility design for a CCTV system infrastructure suitable for the abovementioned barangays. Additionally, it sought to develop a CCTV system tailored to the unique characteristics and requirements of the targeted communities.

Furthermore, the study explored the training needs of residents receiving the CCTV system, aiming to equip them with the necessary system operation and maintenance skills. Lastly, the study aimed to assess the immediate impact of the CCTV system on the area's stakeholders, considering factors such as safety perceptions and community engagement.

By addressing these specific questions, the study aimed to contribute to the development of effective and tailored security solutions for the designated areas.

METHODOLOGY

It has come to the attention of the Barangay Local Government Units of San Miguel and Sta. Rita is situated in Calumpit and Guiguinto, Bulacan, respectively. The Bulacan State University has installed lighting units in some of the Province's Barangays. Inspired by this recent development, the Barangay Officials of the said localities inquired if the University could assist them in developing a device that can monitor the activities within certain critical areas of concern.

The Local Governments of Barangay San Miguel, Calumpit, Bulacan, and Barangay Tibig, Bulakan, Bulacan, were made aware that the College of Industrial Technology, Bulacan State University, has installed lighting units in some of the Barangays within the province. Enthused with this recent development, the Local Government Units inquired if the University could assist them in developing a device to monitor the activities within some critical regions that must be monitored electronically. They implied that a CCTV system should be developed and installed.

This study is anchored on the premise of Educational Action Research, which has its foundations in the writings of John Dewey (2010), who believed that professional educators should become involved in community problem-solving. Its practitioners operate mainly out of educational institutions and focus on developing curriculum, professional development, and applying learning in a social context. It is often the case that university-based action research works on community-based projects.

Dewey argues that education and learning are socially interactive processes; thus, the school itself is a social institution through which social reform can and should take place. He makes a strong case for the importance of education not only as a place to gain content knowledge but also as a place to learn how to live. In his eyes, education should not revolve around acquiring predetermined skills but instead around realizing one's full potential and the ability to use those skills for the greater good.

The developmental research aims to systematically examine products, tools, processes, and models to provide reliable, usable information to practitioners and theorists. It is intricately connected to real-world practice and creates a loop with practice informing research and research, in turn, informing practice.

Type 1 developmental studies focus on a given instructional product, program, process, or tool. They reflect an interest in identifying either general development principles or situation-specific recommendations. Typically, Type 1 studies address not only product design and development but evaluation as well. Sometimes, they may validate a particular design, development technique, or tool.

Data Gathering Tool

A standardized instrument is utilized to determine the project's impact on the community activities of the target area. Purposive sampling was employed to determine the study's respondents, consisting of the different community stakeholders who reside within the environs of the Barangays under study.

A Likert scale was utilized as a reference to determine the descriptive rating of the project's acceptability since it offers a structured and efficient method for collecting, analyzing, and comparing user feedback on the acceptability of devices.

Descriptive Rating	**Range**
Very Highly Acceptable	4.51 - 5.0
Highly Acceptable	3.51 - 4.5
Acceptable	2.51 - 3.5
Slightly Acceptable	1.51 - 2.5
Unacceptable	0 - 1.5

Interviews were conducted to assess the unique preferences of the community members and determine the appropriate location where the system will be installed. Upon installation, further interviews were conducted to assess the project's impact on the general community. The data derived from this activity is reflected in the impact analysis report.

Respondents of the study

To assess the effectiveness of the extension project, beneficiaries were asked to complete a standardized questionnaire created by the Extension Service Office of Bulacan State University. A total of 60 respondents participated in the evaluation, with 30 residents from Barangay Tibig, Bulakan, Bulacan, and 30 from Barangay San Miguel, Calumpit, Bulacan. The respondents were selected through purposive sampling, ensuring they were direct beneficiaries of the project.

RESULTS AND DISCUSSION

The proponents of this extension project were prompted to pursue this community service undertaking mainly due to the requests of the leaders of the communities to install measures to address concerns about undesirable activities perpetrated by either member of the community or outsiders. The community leaders and residents attested to this.

The proponents, therefore, conducted dialogues with community officials on how to address the situation best. Both agreed on the installation of CCTV camera systems. After careful consultations, Memorandums of Agreement (MOA) were signed to formalize the arrangement. The Bulacan State University Legal Office drafted this MOA to assure the commitment of both parties. Pictures at the end of this report depict the event.

An assessment of the peculiarities of the communities and the strategic locations that need to be secured was conducted to optimize the effective range of the system to be installed.

After careful consideration, the installation commenced. Figure 1 depicts the actual installation of the camera system by students of the proponents. Figures 2 and 3 show the layout plans for Barangay San Miguel and

Barangay Tibig, respectively. While figures 4 and 5 present the Display monitor of the areas under surveillance with the newly installed CCTV camera system for Barangay San Miguel and Barangay Tibig, respectively.

Figure 1. Actual installation of cameras within the vicinity of the Barangays

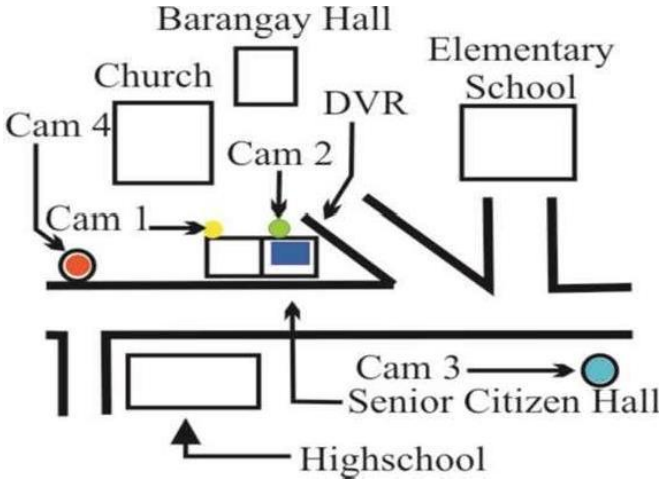

Figure 2. Installation layout of the CCTV System for the vicinity around Barangay San Miguel

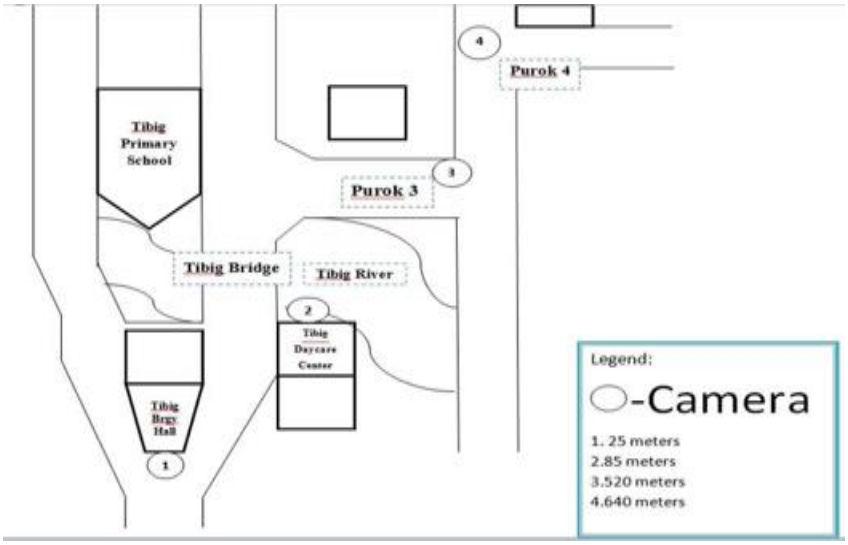

Figure 3. Installation layout of the CCTV System for the vicinity around Barangay Tibig

Figure 4. Display monitor of the areas under surveillance with the newly installed CCTV camera system for Barangay San Miguel

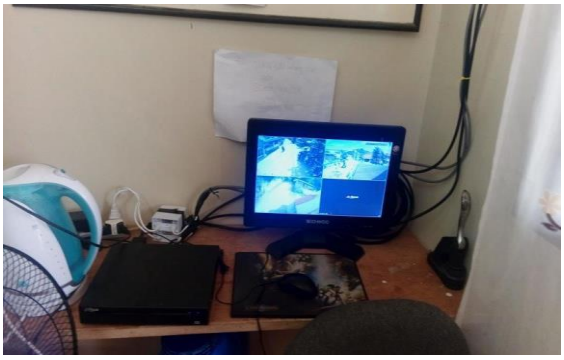

Figure 5. Display monitor of the areas under surveillance with the newly installed CCTV camera system for Barangay Tibig

Evaluation of the Service Rendered

The project extended beyond the mere installation of CCTV infrastructure in the two barangays; it encompassed the comprehensive training of select individuals within the community entrusted with the proficient operation and maintenance of the equipment. This training initiative was conducted collaboratively by the proponents and expert faculty members from Bulacan State University, possessing in-depth knowledge of CCTV systems. Subsequently, to assess the effectiveness of both the installation and training efforts, an evaluation of the services provided by Bulacan State University was conducted to ascertain the satisfaction levels of the project recipients.

Table 1. Evaluation of the Service Rendered by the Recipients (San Miguel)

Service Rendered	**Frequency**					**WM**	**Descriptive Rating**
	5	**4**	**3**	**2**	**1**		
1. Service rendered has lived up to day expectations.	35	5				4.88	**Very Highly Acceptable**
2. The service provided has been beneficial to me.	27	13				4.68	**Very Highly Acceptable**
3. Purpose of the service provided has been met and realized.	34	6				4.85	**Very Highly Acceptable**
4. Service was provided in an organized and systematic manner.	28	12				4.7	**Very Highly Acceptable**
5. Materials and equipment used were appropriate and relevant to the service provided.	30	10				4.75	**Very Highly Acceptable**

6. The service provided has addressed a relevant issue and need of the community.	35	5				4.88	**Very Highly Acceptable**
7. The service rendered has provided ample and applicable information.	26	14				4.65	**Very Highly Acceptable**
8. The service provided is of high quality.	31	9				4.76	**Very Highly Acceptable**
9. Service providers have achieved their purpose.	37	3				4.93	**Very Highly Acceptable**
10. community members were free to participate, cooperate and interact while rendering the service.	33	7				4.83	**Very Highly Acceptable**
11. Time allotted for the implementation of the service was ample.	30	10				4.75	**Very Highly Acceptable**
12. What is your overall impression of the service given?	22	12	6			4.4	**Highly Acceptable**
Mean						4.0	**Very Acceptable**

Table 1 presents an overview of the evaluation conducted among the beneficiaries of the extension project, focusing on their perceptions of the service rendered by the proponents in Barangay San Miguel, Calumpit, Bulacan. The data gleaned from the table showcases a notably positive sentiment among beneficiaries regarding the efficacy of the service providers. Particularly striking is the item about the achievement of the service providers' objectives, which garnered the highest computed mean of 4.93, denoting an overwhelmingly positive rating categorized as highly acceptable. Data suggests that beneficiaries hold a favorable view of the service provider's ability to meet their intended goals and objectives effectively.

Additionally, respondents' assessments of their overall impression of the service yielded an average score of 4.44, indicating a highly acceptable rating. While this score is slightly lower than the item as mentioned above, it nonetheless underscores the overall positive perception of the service provided.

Collectively, the evaluation culminated in a grand mean of 4.76, reinforcing the notion that beneficiaries perceive the CCTV Security System with exceptional favorability. This comprehensive analysis underscores the significant impact of the extension project in Barangay San Miguel, with the service the proponents lauded as highly effective and well-received by the community members.

Based on the findings presented in Table 2, it is evident that the beneficiaries of the extension project in Barangay Tibig, Bulakan, Bulacan, perceived the service provided by the proponents as highly organized and systematic. This is supported by the highest computed mean of 4.36 for the item related to service, indicating a very acceptable rating. However, it is noteworthy that despite the overall positive perception of the service, the item regarding the beneficiaries' overall impression received a slightly lower mean of 3.38, still indicating a very acceptable rating. Nevertheless, when considering all evaluation aspects collectively, the project attained a grand mean of 4.0, underscoring its high acceptability among the beneficiaries.

Table 2. Evaluation of the Service Rendered by the Recipients (Tibig)

Service Rendered	**Frequency**					**WM**	**Descriptive Rating**
	5	**4**	**3**	**2**	**1**		
1. Service rendered has lived up to day expectations.	15	26	9			3.52	**Very Acceptable**
2. The service provided has been beneficial to me.	17	28	2			4.32	**Very Acceptable**
3. Purpose of the service provided has been met and realized.	11	30	8			4.06	**Very Acceptable**
4. Service was provided in an organized and systematic manner.	15	28	8			4.36	**Very Acceptable**

5. Materials and equipment used were appropriate and relevant to the service provided.	14	27	7			4.15	**Very Acceptable**
6. The service provided has addressed a relevant issue and need of the community.	22	19	8			4.29	**Very Acceptable**
7. Service rendered has provided ample and applicable information.	13	28	7			4.13	**Very Acceptable**
8. The service provided is of high quality.	14	26	5			4.20	**Very Acceptable**
9. Service providers have achieved their purpose.	16	26	5			4.17	**Very Acceptable**
10. Members of the community were free to participate, cooperate and interact during the rendering of the service.	15	28	4			4.20	**Very Acceptable**
11. Time allotted for the implementation of the service was ample.	14	30	6			4.16	**Very Acceptable**
12. What is your overall impression of the service given?	1	15	15	3		3.38	**Very Acceptable**
Mean						4.0	**Very Acceptable**

Therefore, while the specific aspect of the overall impression may have slightly lower ratings, the overall sentiment towards the CCTV Security System remains highly favorable among the beneficiaries of the extension project.

Report on the Impact Analysis Interview Conducted

Report on Monitoring Activities of the Extension Project at Barangay San Miguel, Calumpit, Bulacan, revealed through an interview with the Extension Project stakeholders that the proponent found out that several untoward incidents within the vicinity of the barangay were resolved using CCTV camera footage. The CCTV footage was used as evidence to shed light on incidents such as vehicle vandalism, pedestrians hit by speeding vehicles, chicken rustling, and minor altercations between individuals.

The barangay leaders also attested that unruly behavior among the youth was curtailed with the introduction of the CCTV system. Schoolchildren opted to alight public utility vehicles in areas monitored by the cameras for protection.

Generally, the officials and residents of the barangay welcome the pleasant changes that the CCTV system has brought about. They are planning to expand the system to monitor other areas of concern.


Figure 6. The proponents and trainers were at the MOA signing and the CCTV operation and maintenance training sessions.

As for the officials and residents of Barangay Tibig, the recipients of the extension project were pleased by the effects of installing the CCTV system.

The system has shed light on resolving several incidents in the vicinity. Among these incidents included Attempted theft of a motorized boat, perpetrators of repeated illegal garbage dumping, and a domestic dispute between a resident couple; the system was effective in identifying people entering the barangay since it only had two entry point

CONCLUSIONS

Based on the evaluation results, several conclusions can be drawn. Firstly, it was observed that the system comprises appropriate components tailored to maximize the area's unique characteristics. Secondly, the project garnered high acceptance from the recipient barangays, indicating a favorable perception of the initiative within the community. Additionally, regarding the service provided by the project proponents, the recipient barangays rated the service as very highly acceptable, reflecting a positive assessment of the quality and effectiveness of the service rendered.

Based on these conclusions, several recommendations are proposed for further project enhancement. Firstly, it is suggested that additional CCTV units be installed to further fortify the security measures in the area. Secondly, considering areas situated at considerable distances from the monitoring unit, it is advisable to install alternative power supply units to ensure continuous surveillance coverage. Lastly, it is recommended that an impact assessment study be conducted after a specified period to evaluate the long-term effects of the project on the community it serves. This would provide valuable insights into the sustainability and efficacy of the project in addressing security concerns and fostering community well-being over time

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